

## MISSISSIPPIELLIDAE, A NEW EULOBOSINID ("THECAMOEINID") FAMILY (PROTOZOA)

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*Abstract.*—The genus *Mississippiella* Haman, 1982, based on the uniqueness of test composition and construction, along with distinctive apertural morphology, is transferred from the family Paraquadrulidae Deflandre, to the new family Mississippiellidae.

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The Paraquadrulidae was, prior to the discovery of the genus *Mississippiella* by Haman (1982a, b) the only thecamoebian family known to possess an external secreted calcite test (Loeblich and Tappan 1964). This led Haman (1982a, b) to assign *Mississippiella* to this family despite the fact that *Paraquadrula* Deflandre was known only from western European mosses.

Loeblich and Tappan (1964) along with Ogden and Hedley (1980), accept the Paraquadrulidae as a distinct family based on test composition. Page (1982), however, places the genus *Paraquadrula* in the family Nebelidae (which he equates with the Hyalosphenidae), but does acknowledge that "The one calcareous genus (*Paraquadrula*) is sometimes separated into a family." The uncertainty of systematic placement of this calcareous entity is typical of the overall arcellacean classification, a state of affairs lamented upon by Medioli and Scott (1983).

We subscribe to the viewpoint that until stability is attained in arcellacean classification, newly discovered forms should be retained as distinct entities if they differ from previously described taxa. This viewpoint is followed even when the new forms occur with less than optimal abundance. If additional information on the new organism becomes available, which clearly demonstrates a biological affinity to another taxon, it is at that time that any systematic grouping should be undertaken. Presumptive grouping may lead to erroneous observations and conclusions. The retention of the new entity may occur at any level within the hierarchal system and simply depends upon the existing classification scheme. Consequently, based on the significant morphological differences between *Paraquadrula* and *Mississippiella*, plus the fact that the former genus is placed in an accepted family, we remove *Mississippiella* from the Paraquadrulidae and establish the family Mississippiellidae to accommodate the form. A revision of the family Paraquadrulidae to accommodate *Mississippiella* is not believed prudent at this time and would only add to the confusion, detailed above, concerning this family. We are fully cognizant that other workers on the Arcellacea may differ with our philosophy but we believe it to be expedient at present as the "micro-classification of the group remains . . . in a chaotic state" (Medioli and Scott 1983: 6).

Page (1982) claimed that the test of *Paraquadrula* is formed by a calcium replacement of the original silica; however, other workers believe that the quadrangular plates characteristic of this genus are formed of secreted calcite (Loeblich and Tappan 1964; Ogden and Hedley 1980). We favor the second opinion. X-ray energy dispersant analysis of *Mississippiella* utilizing a Kevex 10-channel recorder

showed the test composition to be almost pure calcite with no trace of silica (Haman 1982a, Fig. 27). *Paraquadrula* has been described as having a test composed of "quadrangular calcareous plates which may have thickened rims" (Loeblich and Tappan 1964:C34). The presence of plates or "scales" is a consistent feature found in nearly all nonproteinaceous thecamoebiniids possessing a secreted test of either calcareous or siliceous composition. *Mississippiella* clearly diverges from this pattern by displaying autogenous intergrowths of euhedral calcite rhombs comprising the test.

Ogden and Hedley (1980:3) diagnosed the shells of testate amoebae as being "proteinaceous, agglutinate, siliceous, or calcareous in composition" and that their morphology would normally "consist of one single aperture." This last criterion cannot be regarded as a critical thecamoebiniid feature as demonstrated by the estuarine-marine genus *Trichosphaerium* Doflein which possess multiple circular apertures. *Mississippiella* has an "aperture composed of a series of predominantly ovate openings, variable in number, 10–18 arranged in a crescentic series" (Haman 1982a:366). While the majority of thecamoebiniids have a single aperture (Ogden and Hedley 1980), forms with multiple apertures exist (Page 1982). In addition, Ogden and Hedley (1980) illustrate numerous species which display apertural modifications in the form of circum-apertural pores. Grospietsch (1965) reported that one form of *Hyalosphenia papilio* Leidy has a simple concave aperture, while another has several apertural pores. The openings present on tests of *Mississippiella* are believed to represent the true aperture and not pores as illustrated by Ogden and Hedley (1980). *Paraquadrula* possesses a terminal aperture that is described as oval (Ogden and Hedley 1980) or as oval to slitlike (Loeblich and Tappan 1964) and differs markedly from *Mississippiella*. *Mississippiella* differs from all thecamoebiniid taxa described to date based on apertural characters.

The possession by *Mississippiella* of a secreted, calcitic, non-porcellaneous, imperforate, unichambered test is sufficient to warrant placement within the Arcellinida as defined by Sheehan and Banner (1973), despite the fact that information on the pseudopodia is not currently available and the fact that *Mississippiella* displays features not previously known to exist in thecamoebiniids.

Page (1982) divides the Arcellinida into two suborders, the Eulobosina and the Trichosida. The second suborder is characterized by the single family Trichosphaeriidae and the single genus *Trichosphaerium*. Sheehan and Banner (1973) published a detailed study on this genus and determined that *Trichosphaerium* possesses an external, flexible spicular test with quasi-permanent apertures. Such characteristics clearly exclude *Mississippiella* from this suborder; therefore, this genus is placed in the Eulobosina. The affinities and differences of *Mississippiella* to and from other eulobosiniid taxa have been detailed above. From this discussion it is evident that *Mississippiella* does not demonstrate equitability with any established thecamoebiniid genus or family, and warrants the establishment of a new family, the Mississippiellidae. As the family is monotypic, the characters of the family are those of the genus.

#### Mississippiellidae, new family

*Diagnosis.*—Test free, unilocular, circular to subcircular in outline, discoidal to hemispherical in side view, ventral surface flat to concave; dorsal surface convex; aperture composed of series of predominantly ovate openings, variable

in number, 10–18, arranged in crescentic pattern towards one side of ventral surface; wall composed of autogenous intergrowths of euhedral calcite rhombs.

*Type-genus.*—*Mississippiella* Haman, 1982.

*Type-species.*—*Mississippiella multiapertura* Haman, 1982.

*Type-illustrations.*—Haman (1982:holotype, pl. 2, figs. 11–15; paratypes, pl. 2, figs. 16–22).

*Etymology.*—The family name is derived from the type-locality, the Mississippi Delta.

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